Market Survey Objectives

- analysis of installed fibre base to end-2000
- segmentation by type (50MMF, 62MMF, SMF)
- MMF segmentation by modal bandwidth
- installed backbone link length distribution
- installed fibre bundle sizes & overprovision
- Western Europe & United States addressed

Survey Methodology

- data extracted from supply industry & end users
- fibre/cable volumes from published market research
  - KMI world-wide optical fibre market 1997 & 1998
  - BSRIA European structured cabling 1998
- fibre/cable volumes from manufacturer/supplier surveys
  - telephone interviews & questionnaires
  - key source of fibre size & MB segmentation
- installation data from installers, users, other surveys
  - telephone interviews & questionnaires
  - key source of installation statistics

Survey Data

- fibre/cable data from major manufacturers/suppliers
- installation data from large end user organisations
- data from ~13,000 installed optical backbone links
- data from wide variety of sites, sectors & countries
  - site population 150 to 1,000, with few sites 5,000 to 10,000
  - sites had 150 to 6,000 cabling outlets, few with >10,000 outlets
  - many sole bldgs, many campuses with 1-10 bldgs, some >10
- existing surveys from Nouri, Di Minico & FIA (1996)
- installers generally best source of quantity & quality
- end users generally lacked plans & specifications
Optical Fibre Market by Type (Western Europe)

- 50/62MMF & SMF shipments 1994-2000 from survey
- good correlation of BSRIA & survey MMF data
- amalgamated data extrapolated back to 1990
- good confidence with MMF data
- poor correlation of SMF data, hence low confidence with SMF values and growth estimate

Optical Fibre Market by Modal Bandwidth (Western Europe)

- shares of main fibre types for 1994-2000 from survey
- good correlation of 62MMF data, with 3 MBs identified
- poor correlation of 50MMF data, with 3 MBs identified and several MB grades omitted due to low presence
- survey data then extrapolated back to 1990
- installed base accumulated from 1990-2000 shipments
- pre-1990 fibre considered replaced or extinct

Optical Fibre Market by Cabling Hierarchy and Modal Bandwidth (Western Europe)

- 1997 share of fibre in campus backbone, building backbone & horizontal estimated by BSRIA (1998)
- 1997 above share of fibre assumed constant over time
- installed base accumulated from 1990-2000 shipments
- installed base segmented by cabling hierarchy, fibre type and modal bandwidth

Optical Cable Market by Cabling Hierarchy and Fibre Modal Bandwidth (Western Europe)

- 1997 cable shipments for campus backbone, building backbone & horizontal estimated by BSRIA (1998)
- 1990-2000 cable shipments estimated from fibre CAGR (note: this does not allow for increasing core count)
- share of SMF in backbones based on Nouri (1996)
- installed base accumulated from 1990-2000 shipments
- shipments and base segmented by cabling hierarchy, fibre type and modal bandwidth

Installed Length Distribution in Campus Backbones (Western Europe)

- Flattman 1999
- DiMinico 1996

Installed Length Distribution in Campus Backbones (Western Europe)

- Flattman: 1999
- DiMinico: 1996
Installed Length Distribution in Building Backbones (Western Europe)

- <100m: 15% links
- 101-200m: 20% links
- 201-300m: 25% links
- 301-400m: 20% links
- 401-500m: 10% links
- >500m: 10% links

Share of Fibre Types in Campus Backbone end-2000 Installed Base (Western Europe)

- SMF: 30.5%
- 62MMF 500/500: 31.6%
- 62MMF 200/500: 31.8%
- 62MMF 160/500: 14.3%
- 50MMF 600/1200: 11.9%
- 50MMF 400/800: 11.4%
- 50MMF 500/500: 8.6%
- 62MMF 500/500: 4.0%

Fibre-to-the-Desk (Western Europe)

- Euro suppliers suggest FTTD penetration approx 1-2%
- Almost 1% of total outlets shipped a/c to BSRIA (1998)
Bundle Size & Fibre Overprovision (Western Europe)

- poor correlation in supplier & end user survey data
- no difference seen between 50MMF, 62MMF & SMF
- clear trend identified for increasing cable core count
  - 10.5 fibres per backbone cable - BSRIA (1998) average
  - 2.7 fibres per horizontal cable - BSRIA (1998) average
- strong regional variation seen:
  - UK favours 8-core, followed by 12-core
  - German standard is 12-core, with some up to 144
  - France has 6, 10 and 12-core

Over-provision of Fibres in Campus Backbone Installed Base (Western Europe)

Regional Variation (Western Europe)

Germany: 50MMF 400/800 popular (DBP spec)
  - 50MMF 600/1200 is emerging
  - 50MMF 600/1000 is also seen

France: 50MMF 400/750 most common grade of 50MMF

Holland: 50MMF 400/800 most common grade of 50MMF

Optical Fibre Market by Type (United States)

- MMF shares based on Nouri (1996), DiMinico (1996)
  - 50MMF - 10%
  - 62MMF - 90%
- SMF share based on WIT (1998) ~ 3% total in 1997
- data extrapolated back to 1990 using KMI growth
- wide range of 50MMF shares forecasts for US
  - some estimate 50MMF to be only 1% of installed base
  - TIA FOLS members estimate 50MMF base - 5% in 1996
  - 50MMF may be growing more strongly than 62MMF

Optical Fibre Market by Modal Bandwidth (United States)

- small sample base of data provided by suppliers
- but many global fibre makers are US-based hence shares of main grades are based on Euro survey
- volume shipments calculated for each identified MB
- installed base accumulated from 1990-2000 shipments
Optical Cable Market by Cabling Hierarchy and Fibre Modal Bandwidth (United States)

- 1997 cable shipments for campus backbone, building backbone & horizontal estimated by WIT (1997):
  - campus backbone = 8.4% (Europe = 24.4%)
  - building backbone = 29.0% (Europe = 43.0%)
  - horizontal cabling = 62.6% (Europe = 32.5%)
- data extrapolated back to 1990 using 22.5% CAGR
- installed base accumulated from 1990-2000 shipments
- shipments and base segmented by cabling hierarchy, fibre type and modal bandwidth

Optical Fibre Market by Cabling Hierarchy and Modal Bandwidth (United States)

- fibre shipments are calculated from cable using core average counts estimated by WIT (1997):
  - 18 fibres per campus backbone cable
  - 12 fibres per building backbone cable
  - 2 fibres per horizontal cable
- share of SMF in backbones based on Nouri (1996)
- installed base accumulated from 1990-2000 shipments
- shipments and base segmented by cabling hierarchy, fibre type and modal bandwidth

Installed Length Distribution in Campus Backbones (United States)

Installed Length Distribution in Building Backbones (United States)
Share of Fibre Types in Campus Backbone end-2000 Installed Base (United States)

- SMF: 3.3%
- 62MMF 500/500: 3.5%
- 62MMF 200/500: 3.2%
- 62MMF 160/500: 2.7%
- 50MMF 600/1200: 0.5%
- 50MMF 400/800: 0.2%
- 50MMF 500/500: 5.5%
- 33.8%

Share of Fibre Types in Building Backbone end-2000 Installed Base (United States)

- SMF: 3.5%
- 62MMF 500/500: 3.0%
- 62MMF 200/500: 5.4%
- 62MMF 160/500: 2.7%
- 50MMF 600/1200: 2.7%
- 50MMF 400/800: 3.3%
- 50MMF 500/500: 5.5%
- 44.4%

Fibre-to-the-Desk (United States)

- US suppliers suggest FTTD penetration approx 2-3%
- 3.3% FTTD penetration in US end 1997 a/c to WIT (1998)
- Frost & Sullivan recently estimated FTTD as 2.5% in US

Bundle Size & Fibre Overprovision (United States)

- 18 fibres / campus backbone cable - WIT (1997) average
- 12 fibres / building backbone cable - WIT (1997) average
- 2 fibres / horizontal cable - WIT (1997) average
- strong trend indicated for increasing cable core count
- similar to European backbone cable trends
- no US data on fibre overprovision trends